General

Guideline Title

Recommendations on screening for lung cancer.

Bibliographic Source(s)

Canadian Task Force on Preventive Health Care. Recommendations on screening for lung cancer. CMAJ. 2016 Apr 5;188(6):425-32. [32 references] PubMed

Guideline Status

This is the current release of the guideline.

This guideline updates a previous version: Palda VA, Van Spall HGC. Screening for lung cancer: updated recommendations from the Canadian Task Force on Preventive Health Care. London (ON): Canadian Task Force on Preventive Health Care (CTFPHC); 2003 Aug. 22 p. [28 references]

This guideline meets NGC's 2013 (revised) inclusion criteria.

Recommendations

Major Recommendations

The grades of recommendations (strong, weak) and grades of evidence (high, moderate, low, very low) are defined at the end of the "Major Recommendations" field.

Summary of Recommendations for Clinicians and Policymakers

These recommendations apply to adults 18 years of age and older who are not suspected of having lung cancer. These recommendations do not apply to adults with previous lung cancer, or signs or symptoms of lung cancer.

The Task Force recommends screening for lung cancer among adults aged 55 to 74 years with at least a 30 pack-year smoking history, who smoke or quit smoking less than 15 years ago, with low-dose computed tomography (CT) every year up to three consecutive years. Screening should only be done in health care settings with access to expertise in early diagnosis and treatment of lung cancer. (Weak recommendation, low-quality evidence).

The Task Force recommends not screening all other adults, regardless of age, smoking history or other risk factors, for lung cancer with low-dose CT. (Strong recommendation, very low-quality evidence).

The Task Force recommends that chest radiography, with or without sputum cytology, not be used to screen for lung cancer. (Strong recommendation, low-quality evidence).

Definitions

Grading of Recommendations Assessment, Development and Evaluation (GRADE) Working Group Grades of Evidence

High quality — Further research is very unlikely to change confidence in the estimate of effect.
Moderate quality — Further research is likely to have an important impact on confidence in the estimate of effect and may change the estimate.
Low quality — Further research is very likely to have an important impact on confidence in the estimate of effect and is likely to change the estimate.
Very low quality — The Canadian Task Force on Preventive Health Care (CTFPHC) is very uncertain about the estimate.

Grading of Recommendations

- Strong recommendations are those for which the CTFPHC is confident that the desirable effects of an intervention outweigh its undesirable effects (strong recommendation for an intervention) or that the undesirable effects of an intervention outweigh its desirable effects (strong recommendation against an intervention). A strong recommendation implies that most individuals will be best served by the recommended course of action.
- Weak recommendations are those for which the desirable effects probably outweigh the undesirable effects (weak recommendation for an intervention) or undesirable effects probably outweigh the desirable effects (weak recommendation against an intervention), but appreciable uncertainty exists. A weak recommendation implies that most people would want the recommended course of action but that many would not. Clinicians must recognize that different choices will be appropriate for each individual, and they must help each person arrive at a management decision that is consistent with his or her values and preferences. Policy-making will require substantial debate and involvement of various stakeholders. Weak recommendations result when the balance between desirable and undesirable effects is small, the quality of evidence is lower, or there is more variability in the values and preferences of patients.

Clinical Algorithm(s)

None provided

Scope

Disease/Condition(s)

Lung cancer

Guideline Category

Prevention

Screening

Clinical Specialty

Family Practice

Internal Medicine

Oncology

Preventive Medicine

Pulmonary Medicine

Radiology

Intended Users

Advanced Practice Nurses

Allied Health Personnel

Health Care Providers

Physician Assistants

Physicians

Guideline Objective(s)

To provide primary care providers and policy-makers with guidance on screening for lung cancer

Target Population

Adults aged 18 years and older who are not suspected of having lung cancer

Note: These recommendations do not apply to individuals with previous lung cancer, or signs or symptoms of lung cancer.

Interventions and Practices Considered

Screening for lung cancer with low-dose computed tomography (CT)

Note: Chest radiography, with or without sputum cytology, was considered but not recommended.

Major Outcomes Considered

- All-cause mortality
- Lung cancer mortality
- Stage of lung cancer at diagnosis
- False positive results
- Adverse effects of invasive follow-up testing and overdiagnosis

Methodology

Methods Used to Collect/Select the Evidence

Hand-searches of Published Literature (Secondary Sources)

Searches of Electronic Databases

Searches of Unpublished Data

Description of Methods Used to Collect/Select the Evidence

Note from the National Guideline Clearinghouse (NGC): A systematic review was prepared by the McMaster Evidence Review and Synthesis Centre (ERSC) Team for the Canadian Task Force on Preventive Health Care (CTFPHC) (see the "Availability of Companion Documents" field).

Search Strategy

For the key question on benefits of screening for lung cancer the review team updated the search conducted for the 2013 Cochrane review on lung cancer screening (same databases and search terms). The review team searched CENTRAL, Ovid MEDLINE(R) In-Process & Other Non-Indexed Citations and Ovid MEDLINE(R), and EMBASE from May 2012 (the date of the last Cochrane search) to May 13, 2014 for randomized controlled trials (RCTs) on screening for lung cancer published in English or French. The same databases were searched to look at harms of screening but the date range was extended to 2000 and no limits were placed on study design. Reference lists of on topic systematic reviews were searched for relevant studies not captured by the search. A separate search was conducted to look for evidence that would answer the contextual questions; this strategy included two databases (EMBASE and MEDLINE) and covered the period between January 2009 and June 12, 2014. A focused web-based grey literature search of Canadian sources was also undertaken for the contextual questions. The full search strategies are provided in Appendix 1 of the systematic review.

Study Selection

After removing duplicates, all citations found through the updated search were uploaded to a Web-based systematic review software program for screening. In addition, the studies included in the 2013 lung cancer screening reviews by the Cochrane group and the U.S. Preventive Services Task Force (USPSTF), as well as the studies identified through hand-searching systematic review reference lists, were added to the pool of citations available for relevance testing against the inclusion criteria for this review.

Titles and abstracts of papers considered for the key questions and sub-questions were reviewed in duplicate; articles marked for inclusion by either team member went on to full text relevance testing. Full text screening was done independently by two people with consensus required for inclusion or exclusion.

For citations located in the contextual questions search, title and abstract screening was done by one person.

Inclusion and Exclusion Criteria

Language

The published results of studies had to be available in either English or French.

Population

The population of interest for this review is asymptomatic adults aged 18 years and older who are at average or high risk but are not suspected of having lung cancer (e.g., may have a cough). The population includes current, former and second-hand smokers, as well as those with exposures to substances that may affect risk and other identified factors that may increase risk.

Excluded from this review are studies that focused on people under age 18 or that targeted adults 18 years and older who were either suspected of having lung cancer or were previously diagnosed with lung cancer.

Interventions

The three lung cancer screening interventions of interest included: (1) chest radiography (CXR), (2) low-dose computed tomography (CT), and (3) sputum cytology (SC).

Study Design and Comparison Groups

To answer the key question about the benefits of screening, only RCTs with comparison groups of no screening or comparison between tests were eligible for inclusion; case control, case series and ecological studies were excluded. Any quantitative study design (with or without comparison groups) was considered acceptable to answer the key question about harms of screening.

Outcomes

A CTFPHC working group identified and ranked benefits and harms of lung cancer screening as critical, important or not important in terms of their importance for guideline decision making, using the Grading of Recommendations Assessment, Development and Evaluation (GRADE) approach. GRADE ratings from 7 to 9 indicate critical outcomes and ratings from 4 to 6 are considered important. Outcomes with ratings from 1 to 3 are not considered important, and thus are not examined in this review. For the key question about the benefits of lung cancer screening, the two critical outcomes of interest are lung cancer mortality (GRADE rating=9) and all-cause mortality (9) and the three important outcomes are smoking cessation rate (6), stage at diagnosis (6) and incidental findings (e.g., diagnosis of a thoracic aneurysm) (6). For the key question about the harms of lung cancer screening or follow-up testing, the three critical outcomes are overdiagnosis (9), death from invasive follow-up testing (9), and major complications or morbidity as a result of invasive follow-up testing (7), and the seven important outcomes are false positives (6),

consequences of false positives (6), negative consequences of incidental findings (6), anxiety (5), quality of life (5), infection from invasive follow-up testing (5), and bleeding from invasive follow-up testing (5).

Number of Source Documents

Summary of the Included Studies

The McMaster Evidence Review and Synthesis Centre Team included 33 studies, many with multiple publications that met the inclusion criteria for this review. Thirteen of the studies addressed the key question on the benefits of screening and 30 provided data that were used to answer the key question on the harms of screening or follow-up testing.

Refer to Figure 2 in the systematic review (see the "Availability of Companion Documents" field) for more information on the literature search results.

Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Given)

Rating Scheme for the Strength of the Evidence

Grading of Recommendations Assessment, Development and Evaluation (GRADE) Working Group Grades of Evidence

High quality — Further research is very unlikely to change confidence in the estimate of effect.
Moderate quality — Further research is likely to have an important impact on confidence in the estimate of effect and may change the estimate.
Low quality — Further research is very likely to have an important impact on confidence in the estimate of effect and is likely to change the estimate.
Very low quality — The Canadian Task Force on Preventive Health Care (CTFPHC) is very uncertain about the estimate.

Methods Used to Analyze the Evidence

Meta-Analysis

Review of Published Meta-Analyses

Systematic Review with Evidence Tables

Description of the Methods Used to Analyze the Evidence

Note from the National Guideline Clearinghouse (NGC): A systematic review was prepared by the McMaster Evidence Review and Synthesis Centre (ERSC) Team for the Canadian Task Force on Preventive Health Care (CTFPHC) (see the "Availability of Companion Documents" field).

Data Abstraction

Review team members extracted data about the population, study design, intervention, analysis and results for outcomes of interest. One team member completed full abstraction, followed by a second team member who verified all extracted data and ratings. The review team assessed study quality using Cochrane's Risk of Bias tool (randomized controlled trials [RCTs]) and the Grading of Recommendations Assessment, Development and Evaluation (GRADE) framework. For the contextual questions, inclusion screening and abstraction were done by one person.

Analysis

Risk ratios (RRs) and 95% confidence intervals (CIs) for binary outcomes of benefits of lung cancer screening were calculated using random-effects models. Binary outcomes of harms of screening were reported using proportion per 1,000. Continuous outcomes of harms of screening (e.g., anxiety and quality of life) were reported as mean difference or mean change scores with 95% CIs. Test properties were reported

descriptively using means or medians with ranges. GRADE tables were prepared for critical benefits (lung cancer and all-cause mortality) and critical harms (overdiagnosis, death or major complications/morbidity resulting from invasive follow-up testing). For all other outcomes and subgroups, available data were meta-analyzed when appropriate or presented narratively.

Refer to the systematic review for additional information on assessing strength or quality of evidence and data analysis.

Methods Used to Formulate the Recommendations

Expert Consensus

Description of Methods Used to Formulate the Recommendations

Methods

The Canadian Task Force on Preventive Health Care is an independent panel of clinicians and methodologists that makes recommendations about clinical manoeuvres aimed at primary and secondary prevention (www.canadiantaskforce.ca). These recommendations were developed by a work group of six members of the task force and scientific staff at the Public Health Agency of Canada.

A systematic review to inform this guideline was conducted by the Evidence Review and Synthesis Centre at McMaster University (Hamilton, Ontario), with the aid of a clinical expert, who served as an independent advisor, and scientific staff at the Public Health Agency of Canada. The systematic review evaluated the benefits and harms of screening for lung cancer on the outcomes of all-cause mortality, lung cancer–specific mortality, stage of lung cancer at diagnosis, rate of smoking cessation, false-positive results, adverse effects of invasive follow-up testing and overdiagnosis. An outline of the analytic framework with key and contextual questions is available in Appendix 1 (see the online appendices [see the "Availability of Companion Documents" field]). The Evidence Review and Synthesis Centre and the task force used the Grading of Recommendations Assessment, Development and Evaluation (GRADE) system to determine the quality of evidence and strength of recommendations (see Box 1 in the original guideline document).

Analytic Framework, Key Questions and Contextual Questions

The analytic framework for this review is presented in Figure 1 in the systematic review.

The key questions and sub-questions considered for the review are:

- Key Question 1: What are the clinical benefits of screening for lung cancer in adults not suspected of having lung cancer (lung cancer mortality, all-cause mortality, stage at diagnosis, smoking cessation rate, incidental findings)?
    a. What is the difference in screening effectiveness in populations and subgroups with varying risk for lung cancer (age, gender, smoking history)?
- Key Question 2: What are the harms of screening for lung cancer in adults not suspected of having lung cancer (overdiagnosis, death from invasive follow-up testing, major complications or morbidity from invasive follow-up testing, false positives, consequences of false positives, negative consequences of incidental findings, anxiety, quality of life, infection from invasive follow-up testing, bleeding from invasive follow-up testing)
    b. What is the difference in harms in populations and subgroups with varying risk for lung cancer (age, gender, smoking history)?

The contextual questions considered for the review are:

- Contextual Question 1: What is the evidence that test characteristics for effective lung cancer screening tests (sensitivity and specificity, false positives and false negatives, negative and positive predictive values, and test positivity rate) differ by subgroups with varying risk for lung cancer?
- Contextual Question 2: What is the difference in test performance with changes and improvements in low-dose computed tomography technology or varying protocols used by radiologists?
- Contextual Question 3: What are participants' values and preferences on screening for lung cancer?
- Contextual Question 4: What is the optimal screening interval for screening for lung cancer?
- Contextual Question 5: What risk assessment tools are identified in the literature to assess the risk of lung cancer?
- Contextual Question 6: What is the evidence that subgroups (Aboriginal populations, rural or remote populations, other ethnic populations) have a higher burden of disease, a differential treatment response, differential performance of screening tests, or barriers to implementation?
- Contextual Question 7: What is the cost-effectiveness of screening for lung cancer?

Rating Scheme for the Strength of the Recommendations

Grading of Recommendations

- Strong recommendations are those for which the Canadian Task Force on Preventive Health Care (CTFPHC) is confident that the desirable effects of an intervention outweigh its undesirable effects (strong recommendation for an intervention) or that the undesirable effects of an intervention outweigh its desirable effects (strong recommendation against an intervention). A strong recommendation implies that most people will be best served by the recommended course of action.
- Weak recommendations are those for which the desirable effects probably outweigh the undesirable effects (weak recommendation for an intervention) or undesirable effects probably outweigh the desirable effects (weak recommendation against an intervention) but appreciable uncertainty exists. A weak recommendation implies that most women would want the recommended course of action, but many would not. For clinicians, this means they must recognize that different choices will be appropriate for individual women, and they must help each woman arrive at a management decision consistent with her own values and preferences. Policy-making will require substantial debate and involvement of various stakeholders. Weak recommendations result when the balance between desirable and undesirable effects is small, the quality of evidence is lower, and there is more variability in the values and preferences of patients.

Cost Analysis

Economic Implications

Data from a microsimulation model (the Cancer Risk Management Model) were used to assess the costs and consequences of screening for lung cancer in Canada as recommended in the current guideline. This model is based on the results of the National Lung Screening Trial but compares the costs and consequences of low-dose computed tomography (CT) screening with no screening. The review team assessed the model according to task force processes, and it was deemed appropriate for use in this context.

Based on a scenario aligned with the current guideline, and assuming that 100% of patients meeting the eligibility criteria of the National Lung Screening Trial participated in screening (with 95% participating in rescreening as recommended), the incremental system cost would be $2.3 billion between 2014 and 2034. Although indirect costs were not incorporated in the model, the incremental cost-effectiveness ratio, compared with no screening, would be $74,000 per quality-adjusted life-year, suggesting that (if done in centres with appropriate expertise) low-dose CT screening could represent reasonable value for money.

Several factors affect these estimates, including assumptions about rates of screening participation and rescreening compliance. However, screening remained economically attractive using conventional thresholds when rescreening adherence rates were varied within plausible ranges. In addition, low-dose CT screening appeared to be more economically attractive when combined with a smoking cessation program.

Method of Guideline Validation

Comparison with Guidelines from Other Groups

External Peer Review

Internal Peer Review

Description of Method of Guideline Validation

The recommendations were revised and approved by the entire task force and underwent external review by academic and clinical experts in the area.

Other Guidelines

These new recommendations generally align with other Canadian and international guidelines on screening for lung cancer (see Table 1 in the original guideline document). However, the task force is taking a more conservative approach in recommending three annual scans rather than continuous annual or biennial scans.

Table 1 in the original guideline document provides a comparison between the current and previous Canadian Task Force on Preventive Health Care (CTFPHC) guidelines, as well as recommendations from other groups.

Evidence Supporting the Recommendations

Type of Evidence Supporting the Recommendations

The type of supporting evidence is identified and graded for each recommendation (see the "Major Recommendations" field).

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

Benefits of Screening

The systematic review performed for the task force included 33 studies on lung cancer screening; 13 randomized controlled trials (RCTs) studied the benefits of screening. Seven low-quality studies evaluated screening with chest radiography (with or without sputum cytology), compared with no screening or less intensive screening (e.g., screening with chest radiography at longer intervals or advice to have a chest radiograph) and found small benefits in terms of early disease detection. Screening with chest radiography detected more early-stage and fewer late-stage lung cancers compared with groups receiving usual care. However, such screening did not reduce lung cancer specific mortality (risk ratio [RR] 0.99, 95% confidence interval [CI] 0.92–1.07]) or all-cause mortality (RR 0.98, 95% CI 0.96–1.00) when compared with usual care.

Three low-quality trials compared annual screening with low-dose computed tomography (CT) to no screening or usual care and found no difference in lung cancer-specific mortality (RR 1.30, 95% CI 0.81–2.11) or all-cause mortality (RR 1.38, 95% CI 0.86–2.22) after five years or less of follow-up. A recent update of the literature search found one randomized study presenting interim results on early detection of lung cancer with low-dose multislice CT (compared with no screening) in Germany after five years of follow-up. The addition of these new results to the all-cause mortality analysis did not significantly alter the results (RR 1.20, 95% CI 0.83–1.73).

Two studies were found that compared low-dose CT to chest radiography. Although screening with chest radiography is not considered standard care in Canada, these studies were included in the evidence review because prior studies had shown no differences in mortality outcomes between chest radiography and usual care. One of the studies included mortality outcomes (National Lung Screening Trial). The National Lung Screening Trial (a high-quality RCT) reported a 15% reduction in lung cancer mortality (RR 0.85, 95% CI 0.75–0.96) and a 6% reduction in all-cause mortality (RR 0.94, 95% CI 0.88–1.00) associated with screening with low-dose CT compared with chest radiography after 6.5 years of follow-up. This means that screening 1000 people with low-dose CT three times at one-year intervals prevents three deaths from lung cancer compared with screening with chest radiography (number needed to screen = 322). Screening with low-dose CT reduced the absolute risk of lung cancer mortality by 0.31% and of all-cause mortality by 0.46%. Low-dose CT also detected significantly more cases of early-stage lung cancer (8 more per 1000 people screened) and significantly fewer cases of late-stage lung cancer (4 fewer per 1000 people screened) compared with chest radiography. Results from the second study comparing low-dose CT and chest radiography were not pooled with results of the National Lung Screening Trial in the systematic review because of an incompatible follow-up period (≤12 mo), the small number of reported events (lung cancers) and no reporting of mortality outcomes.

Evidence from four studies showed no significant differences in rates of smoking cessation between the screened (low-dose CT or chest radiography) groups and the control groups. The risk of bias for these studies was unclear because of the self-reported nature of this outcome.

Potential Harms

Harms of Screening

The harms of screening and invasive follow-up tests were informed by 31 studies, many with observational designs. The main harms included false-positive results, death or major complications from invasive follow-up testing and overdiagnosis.

Data from the National Lung Screening Trial suggest that of every 1000 people screened three times with low-dose computed tomography (CT) at one-year intervals, 391 would have at least one positive result, 40 would have lung cancer and 351 would have a false-positive result. As such, follow-up tests, including minor invasive procedures (e.g., bronchoscopy, needle biopsy) or major invasive procedures (e.g., thoracotomy, thoracoscopy), are needed to determine whether a positive low-dose CT result is due to lung cancer. Although uncommon, there is a risk of major complications or death with these procedures. Based on data from the National Lung Screening Trial, 3 people per 1000 screened with low-dose

CT experience major complications from invasive tests, and less than 1 person per 1000 screened die after an invasive test (within 60 days). Some of these complications occur in people who receive a false-positive screening result. Data from 17 studies showed that 5 people per 1000 screened with low-dose CT received an unnecessary major invasive procedure for an ultimately benign condition (compared with 3 people per 1000 screened with chest radiography).

Overdiagnosis occurs when people who are asymptomatic undergo screening for lung cancer and a slow-growing cancer that would have never caused them any harm during their lifetime is detected and diagnosed. Although current estimates of overdiagnosis for lung cancer vary by thresholds used and are based on limited follow-up, observational studies suggest that 2% to 16% of lung cancers detected with chest radiography and 11% to 26% of lung cancers detected with low-dose CT represent overdiagnosis. Overdiagnosis often leads to unnecessary treatment (overtreatment), which can cause harm.

Qualifying Statements

Qualifying Statements

The views of the funding bodies have not influenced the content of the guideline; competing interests have been recorded and addressed. The views expressed in this article are those of the authors and do not necessarily represent those of the Public Health Agency of Canada.

Gaps in Knowledge

There is limited evidence for the optimal duration (e.g., ongoing screening after the initial 3 annual scans) and interval (e.g., annual, biennial) for lung cancer screening. In addition, the cut point for a positive scan result varied across studies. Further research is needed to determine optimal management of lung nodules and diagnostic practices. Until such evidence is available, the protocol used in the National Lung Screening Trial should be used.

Further research is needed to determine whether risk assessment tools could be incorporated into the clinical algorithm, and what impact this would have on patient-important outcomes. Whether adults with other risk factors for lung cancer (e.g., exposure to radon, second-hand smoke and other toxic substances; occupational exposures; family history or prior radiation to the chest) or with less extensive smoking histories may also benefit from screening with low-dose computed tomography (CT) is unknown. Better data on how to identify those who will not benefit from screening because of competing morbidities should be a high priority for future research.

Implementation of the Guideline

Description of Implementation Strategy

Considerations for Implementation

These recommendations apply only to adults who are not suspected of having lung cancer on clinical grounds. In adults with symptoms of lung cancer (e.g., hemoptysis, weight loss, dyspnea), regardless of age or smoking history, clinicians should consider diagnostic testing as clinically indicated.

A weak recommendation means that most eligible adults would want to be screened for lung cancer, but many may appropriately choose not to be screened. Primary care providers should discuss the potential harms and benefits of screening with patients at high risk of developing lung cancer based on age and smoking history. Providers should also consider overall health status when discussing this issue with patients, because reasonable life expectancy and suitability for treatment of lung cancer (if identified) is required to benefit from screening. People who place a higher value on a potential mortality benefit and are less concerned with the harms associated with screening (e.g., high false-positive rate, complications from follow-up testing) will be more likely to choose screening, whereas those more concerned with the harms and small mortality benefit may choose not to be screened.

Because the accuracy of detection and quality of follow-up investigations and management are critical to obtaining more benefit than harm, screening for lung cancer with low-dose computed tomography (CT) should only be considered in settings that can deliver comprehensive care similar to or better than that offered in the National Lung Screening Trial (e.g., centres with qualified radiologists and radiologic technologists, with examinations and diagnostic follow-up guidelines aligned with the study protocol and with expertise in the early diagnosis and management of lung

cancer). Incorporation of nodule risk calculators may also decrease risk of overdiagnosis and rates of false-positive results. Implementation of these recommendations in settings without relevant expertise may decrease the benefit: harm ratio, potentially increasing the harms. The task force recognizes that low-dose CT scans and such expertise are not currently accessible in certain regions in Canada (e.g., rural and remote areas), and this is a consideration that policy-makers will need to address.

Patient Values and Preferences

Patient preferences on screening for lung cancer were assessed in seven studies included in the systematic review, as well as de novo data collection conducted for the task force. The systematic review concluded that most participants in the high-risk group (i.e., adults 55–74 years of age who smoke or have quit smoking) had high willingness to participate in screening for lung cancer, motivated by their smoking history, belief that early detection improves health outcomes and a family history of lung cancer. Potential barriers to participation included inconvenience of screening and negative experiences with health care workers or settings. Patients who were screened for lung cancer with low-dose CT did not feel substantial distress or anxiety. In the judgment of the task force, the consistent evidence showing that patients at high risk are willing to be screened for lung cancer supports the recommendation for screening in this group.

The task force conducted a series of focus groups and a survey with 15 members of the public (mean age 63 years [range 36 to 76 years], 12 were female and 8 smoked or had quit smoking) to assess patient perceptions of these recommendations for screening for lung cancer. In general, participants agreed that these recommendations were appropriate, beneficial and feasible, although some had concerns about access to low-dose CT scans and limiting eligibility to adults between 55 and 74 years.

Other Considerations

It is possible that longer or more intensive screening might yield additional benefits, but this is speculative, since there are no randomized controlled trial (RCT) data to support such a recommendation. Although ongoing screening (i.e., more than 3 screens) might further reduce mortality, it might also lead to more false-positive results and complications from invasive follow-up testing, potentially disrupting the balance between the benefits and harms as reported in the National Lung Screening Trial study.

Smoking remains the primary risk factor for lung cancer; therefore, interventions to promote smoking cessation (which have benefits beyond decreasing the risk of lung cancer) should be incorporated into any screening program aimed at reducing lung cancer morbidity and mortality. Smoking cessation resources can be found in the Canadian Best Practices Portal of the Public Health Agency of Canada.

Suggested Performance Measures

National-level quality indicators are currently being developed by the Pan-Canadian Lung Cancer Screening Network. Additional suggested performance measures, although difficult to measure, include rates of discussion of screening for lung cancer using low-dose CT among populations at high risk and the proportion of potentially eligible adults receiving accurate information about the risks and benefits of screening (ideally using an evidence-based decision aid). Reduction in use of chest radiography to screen for lung cancer is a potentially important implementation measure. Harms of screening and follow-up tests in different settings should also be continually assessed. Incidence and mortality data related to lung cancer should continue to be monitored at the provincial, territorial and national levels.

Implementation Tools

Audit Criteria/Indicators

Foreign Language Translations

Mobile Device Resources

Quick Reference Guides/Physician Guides

Resources

Staff Training/Competency Material

For information about availability, see the *Availability of Companion Documents* and *Patient Resources* fields below.

Institute of Medicine (IOM) National Healthcare Quality Report

Categories

IOM Care Need

Staying Healthy

IOM Domain

Effectiveness

Identifying Information and Availability

Bibliographic Source(s)

Canadian Task Force on Preventive Health Care. Recommendations on screening for lung cancer. CMAJ. 2016 Apr 5;188(6):425-32. [32 references] PubMed

Adaptation

Not applicable: The guideline was not adapted from another source.

Date Released

2016 Apr 5

Guideline Developer(s)

Canadian Task Force on Preventive Health Care - National Government Agency [Non-U.S.]

Source(s) of Funding

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Guideline Committee

Canadian Task Force on Preventive Health Care (CTFPHC)

Composition of Group That Authored the Guideline

Guideline Writing Group: Gabriela Lewin, Department of Family Medicine, University of Ottawa, Ottawa, Ont.; Kate Morissette, Public Health Agency of Canada, Ottawa, Ont.; James Dickinson, Departments of Family Medicine and Community Health Sciences, University of Calgary, Calgary, Alta.; Neil Bell, Department of Family Medicine, University of Alberta, Edmonton, Alta.; Maria Bacchus, Department of Medicine, University of Calgary, Calgary, Alta.; Harminder Singh, Departments of Internal Medicine and Community Health Sciences, University of Manitoba, Winnipeg, Man.; Marcello Tonelli, Office of the Associate Dean (Research), University of Calgary, Calgary, Alta.; Alejandra Jaramillo

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Financial Disclosures/Conflicts of Interest

The views of the funding bodies have not influenced the content of the guideline; competing interests have been recorded and addressed.

Competing Interests: None of the authors (members of the guideline writing group) have declared competing interests.

Guideline Endorser(s)

College of Family Physicians of Canada - Professional Association

Guideline Status

This is the current release of the guideline.

This guideline updates a previous version: Palda VA, Van Spall HGC. Screening for lung cancer: updated recommendations from the Canadian Task Force on Preventive Health Care. London (ON): Canadian Task Force on Preventive Health Care (CTFPHC); 2003 Aug. 22 p. [28 references]

This guideline meets NGC's 2013 (revised) inclusion criteria.

Guideline Availability

Available from the Canadian Medical Association Journal (CMAJ) Web site .

Availability of Companion Documents

The following are available:

- Screening for lung cancer: systematic review and meta-analyses. Hamilton (ON): Evidence Review and Synthesis Centre, McMaster University; 2015 Mar 31. 145 p. Available from the Canadian Task Force on Preventive Health Care (CTFPHC) Web site .
- Recommendations on screening for lung cancer. Online appendices 1-2. Ottawa (ON): Canadian Task Force on Preventive Health Care; 2016. Available from the Canadian Medical Association Journal (CMAJ) Web site .
- Screening for lung cancer: systematic review and meta-analyses. Excluded studies list. Ottawa (ON): Canadian Task Force on Preventive Health Care; 2015 Jan. 12 p. Available from the CTFPHC Web site .
- Screening for lung cancer. Clinician summary. Ottawa (ON): Canadian Task Force on Preventive Health Care; 2016. 2 p. Available in English and French from the CTFPHC Web site.
- Lung cancer screening. Clinician FAQ. Ottawa (ON): Canadian Task Force on Preventive Health Care; 2016. 1 p. Available in English and French from the CTFPHC Web site.
- Protocol: screening for lung cancer. Ottawa (ON): Canadian Task Force on Preventive Health Care; 2014 May. 10 p. Available from the CTFPHC Web site .
- Recommendations on screening for lung cancer. Podcast. Available from the CMAJ Web site .
- Recommendations on screening for lung cancer. Continuing medical education (CME) course. Ottawa (ON): Canadian Task Force on Preventive Health Care; 2016. Available from the CMAJ Web site .
- Recommendations on screening for lung cancer in primary care. Webinar presentation. Ottawa (ON): Canadian Task Force on Preventive Health Care; 2016. Available from the CTFPHC Web site .
- Bashir NY, Mascarenhas A, Moore JE, Tonelli M, Straus S. Patient preferences for lung cancer screening guideline recommendations. Toronto (ON): Li Ka Shing Knowledge Institute, St. Michael's Hospital; 2015 Jul 6. 52 p. Available from the CTFPHC Web site .
- GRADE (Grades of recommendation, assessment, development, and evaluation). Ottawa (ON): Canadian Task Force on Preventive

Health Care Health Care; 2011. 2 p. Available in English and French from the CTFPHC Web site.

- Canadian Task Force on Preventive Health Care procedure manual. Ottawa (ON): Canadian Task Force on Preventive Health Care; 2014 Mar. 83 p. Available from the CTFPHC Web site.

There is a CTFPHC mobile app for primary care practitioners available for download from the CTFPHC Web site.

Patient Resources

None available

NGC Status

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